

passing through a first region having a first perimeter and to pass light through a second region between the first perimeter and a second perimeter that surrounds the first perimeter, wherein parameters [of the off-axis illumination] associated with at least one of the first perimeter and the second perimeter are optimized to compensate for a phase shift error in the phase shifting mask.

29. (Amended) A lithographic system, comprising:

an illuminator adapted for providing a source of light;

a restrictor [adapted] to provide off-axis illumination, the restrictor to restrict light from passing through a first region having a first perimeter and to pass light through a second region between the first perimeter and a second perimeter that surrounds the first perimeter;

a phase shifting mask, wherein parameters [of the off-axis illumination] associated with at least one of the first perimeter and the second perimeter are optimized to compensate for a phase error in the phase shifting mask; and

an optics lens for focusing light on a photoresist layer that overlies a conductive layer on a substrate.

32. (Amended) A system, comprising:

a phase shifting mask having a phase shift error;

an illuminator configured for off-axis illumination, the illuminator being configured to restrict light from passing through a first region having a first perimeter and to pass light through a second region between the first perimeter and a second perimeter that surrounds the first perimeter;

wherein [the] a number of off-axis illumination parameters associated with at least one of the first perimeter and the second perimeter are optimized to compensate for the effects of the phase shift error;

wherein the illuminator uses empirical data in optimizing the off-axis illumination parameters; and

wherein the empirical data is taken from one or more simulations of an image on the attenuating phase shifting mask.

36. (Amended) An illuminator for a lithographic system, comprising:
a light source for providing light; and
a restrictor for providing off-axis illumination, the restrictor to restrict light from passing through a first region having a first perimeter and to pass light through a second region between the first perimeter and a second perimeter that surrounds the first perimeter, wherein the restrictor provides means for optimizing parameters [of the off-axis illumination] associated with at least one of the first parameter and the second parameter to compensate for a phase error in a phase shifting mask.
39. (Amended) An illuminator, comprising:
a light source for providing light; and
a restrictor to restrict light from passing through a first region having a first perimeter and to pass light through a second region between the first perimeter and a second perimeter that surrounds the first perimeter, wherein the restrictor provides means for optimizing printing of a phase shifting mask.
40. (Amended) A method, comprising:
providing a phase shifting mask;
providing off-axis illumination, including restricting light from passing through a first region having a first perimeter and passing light through a second region between the first perimeter and a second perimeter that surrounds the first perimeter;
simulating an image on the phase shifting mask; and
adjusting parameters of the off-axis illumination, including adjusting parameters associated with at least one of the first perimeter and the second perimeter.
51. (Amended) A method of compensating for a phase error in a phase shifting mask, comprising:
providing off-axis illumination, including restricting light from passing through a first region having a first perimeter and passing light through a second region between the first

perimeter and a second perimeter that surrounds the first perimeter;

simulating an image on the phase shifting mask; and

adjusting parameters for the off-axis illumination based upon one or more image simulations.

57. (Amended) A system, comprising:

an illuminator;

a restrictor adjustment on the illuminator to adjust off-axis illumination by adjusting at least one parameter associated with at least one of a first perimeter and a second perimeter that surrounds the first perimeter, wherein the restrictor adjustment varies [wherein] light from the illuminator [is varied] with respect to an optical axis, and restricts light from passing through a first region defined by the first perimeter and passes light through a second region between the first perimeter and the second perimeter; and

a phase shifting mask, wherein the restrictor adjustment on the illuminator compensates for a phase shift error in the phase shifting mask.

63. (New) A lithographic system, comprising:

an illuminator adapted for providing a source of light;

a restrictor adapted to provide off-axis illumination, the restrictor including a ring having an inner radius and an outer radius, wherein light is not passed within the inner radius;

a phase shifting mask, wherein parameters of the off-axis illumination are optimized to compensate for a phase error in the phase shifting mask; and

an optics lens for focusing light on a photoresist layer that overlies a conductive layer on a substrate.

64. (New) An illuminator for a lithographic system, comprising:

a light source for providing light; and

a restrictor for providing off-a. is illumination, the restrictor including a ring having an inner radius and an outer radius, wherein light is not passed within the inner radius, wherein the

restrictor provides means for optimizing parameters of the off-axis illumination to compensate for a phase error in a phase shifting mask.

65. (New) A method of compensating for a phase error in a phase shifting mask, comprising: providing off-axis illumination, including providing a light source and a restrictor ring for controlling the light source;

simulating an image on the phase shifting mask; and

adjusting parameters for the off-axis illumination based upon one or more image simulations.

66. (New) A method of compensating for a phase error in a phase shifting mask, comprising: providing off-axis illumination, including providing a light source and a restrictor sigma in and a restrictor sigma out for controlling the light source;

simulating an image on the phase shifting mask; and

adjusting parameters for the off-axis illumination based upon one or more image simulations.

67. (New) A method of compensating for a phase error in a phase shifting mask, comprising: providing off-axis illumination;

simulating an image on the phase shifting mask, including varying a depth of focus of the image on the phase shifting mask and varying sigma in and sigma out parameters; and

adjusting parameters for the off-axis illumination based upon one or more image simulations.